

The July Aquariads 1880. By Edwin F. Sawyer, Esq.

The region situated within the boundary of the constellation *Aquarius* appears to offer attractions of more than ordinary interest to the meteor observer during the months of July and August, and especially at the end of the former month; an inspection of the Catalogues of various observers showing that many meteor tracks have been registered at this epoch, radiating from several quite well defined and apparently independent meteor streams centred in this constellation. Dr. Schmidt's observations of these meteors certainly extend back to the year 1849, for on July 28th and 29th of that year he found a position at R.A. $322^{\circ}5-5^{\circ}$, and his Catalogue, based on observations made between the years 1842 and 1868, contains no less than nine independent positions deduced during this epoch and situated in this region.

These meteors have also been frequently observed by Heis, Tupman, Neumayer, Weiss, Denning, Corder, and others. Mr. Denning found these *Aquariads* especially numerous at the end of July, in the years 1878 and 1879, furnishing meteor showers of considerable intensity (see the valuable paper by Mr. Denning in these *Notices*, vol. xl. No. 3).

My attention having been particularly directed to these meteors by this paper, a series of observations was arranged and quite successfully carried out by me this year. Watches were maintained on the evenings of July 28, 29, 30, 31, and August 1, and these *Aquariads* were found to be quite numerous, especially on the 29th and 30th.

The following table shows the number of hours spent in watching, and the number of meteors recorded :—

Date 1880.	Duration of Watch. h.	Length of Watch. h.	No. of Meteors seen.	Aqua- riads.	State of Sky, &c.
July 28	9 to 12	3	14	6	Clear; moon after 11.15 p.m. troublesome; meteors scarce. Hazy at times and partly cloudy.
„ 29	9 „ 12	3	30	11	Meteors numerous.
„ 30	9 „ 12	3	36	11	Generally very clear, with the exception of a slight haze after 11.30. Meteors numerous.
„ 31	9 „ 11	2	10	2	Generally hazy.
Aug. 1	9 „ 11	2	12	2	Quite clear.
July 28- Aug. 1	9 „ 12	13	102	32	

Of the different magnitudes of brightness there were observed the following:—

24	> 1st mag.	★ = 1st mag.	= 2nd mag.	= 3rd mag.	= 4th mag.	= 5th mag.	and fainter.	Total.
2	5	18	13	18	19	27		= 102

On reducing the observations I was very much surprised to find that, instead of one radiant-centre furnishing the meteors from this constellation, there were at least three independent positions shown to exist; and the chief display was from a position at R.A. $330^{\circ}-6^{\circ}$, this centre being quite accurately determined from several short paths near the focus, and giving a good radiation. Of the 32 Aquariads recorded 20 belonged to this stream. The shower R.A. $341^{\circ}-13^{\circ}$, as deduced by Mr. Denning, and found by him to furnish the chief display, appeared quite inactive this year, although the position was feebly indicated by four short paths, and giving the centre as at R.A. $341^{\circ}-10^{\circ}$. The third position was found to lie at R.A. $328^{\circ}-15^{\circ}$, and was well determined from several very short paths accurately recorded near the focus. Eight paths altogether were recorded belonging to this position. The meteors from the chief radiant at $330^{\circ}-6^{\circ}$ were generally quite slow, of medium length and very bright, and from the other positions generally fainter and more rapid.

In looking over the various Catalogues accessible to me, several positions were found which appear to fully corroborate my results, the agreement in the majority of cases being quite close.

These positions together with mine are given below for comparison.

1st.			
Denning,	July 16-25,	1876 = R.A.	$337^{\circ}-7^{\circ}$
"	" 5-17	1877 = "	$336^{\circ}-7^{\circ}$
Heis	Aug. 21	1877 = "	$336^{\circ}-5^{\circ}$
Sawyer	" 28	1880 = "	$330^{\circ}-6^{\circ}$
Corder	" 29-30	1880 = "	$331^{\circ}-10^{\circ}$

Average = R.A. $334^{\circ}-7^{\circ}$

2nd.			
Tupman,	July 27-28,	1870 = R.A.	$340^{\circ}-14^{\circ}$
Denning	" 27-29,	1878 = "	$341^{\circ}-13^{\circ}$
"	" 28,	1879 = "	$338^{\circ}-14^{\circ}$
Schmidt,	" 20-31,	= "	$340^{\circ}-8^{\circ}$
Sawyer,	" 28,	1880 = "	$341^{\circ}-10^{\circ}$
Corder,	July and Aug.	= "	$337^{\circ}-13^{\circ}$

Average = R.A. $340^{\circ}-12^{\circ}$

3rd.

Schmidt,	July 20-31,	= R.A.	$333^{\circ}-14^{\circ}$
Tupman,	„ 28,	= „	$326-13$
Sawyer,	„ 28-29, 1880 =	„	$328-15$
Average = R.A.			$329-14$

These radiants also furnish many meteors during August and would appear to represent long enduring showers.

Cambridgeport, Mass., U.S.A.
1880, Sept. 30.

Mr. F. Cooper, in a letter dated Sheffield, Sept. 27, 1880, records an Outbreak on the Sun's surface, seen by him on Saturday August 14, while examining sun-spots with a power of 85 on a three-inch refractor, four feet focal length: at about $4^h 15^m$, G. M. T., he was scrutinising a small spot at the southern end of the group when suddenly, at an apparent distance of $10''$ following, an intensely bright spot burst out, vanishing again before he had time to change the power. The colour of the Outbreak was a deep chrome yellow. He had no time to measure the diameter, but it was apparently about $3''$. The coloured glass was a neutral tint. The Outbreak was much brighter than the Sun's disk, and the brighter and more deeply coloured of the faculae, of which much was observable. At the time of observation the air was clear and still, no boiling, definition very good, the mottled appearance well and sharply defined generally over the Sun's surface. He inquires whether the phenomenon was seen by any other observer; or could it be merely an optical delusion?

As regards the magnetic condition at the time, Mr. Ellis writes that at Greenwich an active magnetic disturbance commenced 1880, Aug. 10, $22^h 30^m$, and continued till Aug. 11, 12^h . The magnets were quiet to Aug. 12, 0^h , and then very much disturbed till Aug. 12, 18^h ; tolerably quiet till Aug. 13, 4^h , and then disturbed till Aug. 13, 18^h ; afterwards and during Aug. 14 all pretty quiet; very little motion then till Aug. 18. Previous to Aug. 10, the magnets had been tolerably quiet.

Mr. Cromwell F. Varley, in a letter dated 2 Great Winchester Street, Nov. 5, 1880 (accompanied by a sketch), gives an account of an unusually fine Meteor seen by him the preceding night, $3\frac{1}{2}$ minutes to 10^h or $10^h 15^m$ while returning home to Bexley Heath, $11\frac{3}{4}$ miles E. on the main road. The meteor lasted one to one and a half seconds, being at its brightest more than 12 times as bright as *Jupiter*, and it suddenly disappeared near β *Orionis* (Rigel), leaving a brilliant green train which lasted from five to six seconds; the colour and brilliancy of this train resembled the voltaic arc taken between silver electrodes.